SEQUENCE LISTING

<110> Korneluk, Robert G.
MacKenzie, Alexander E.
Baird, Stephen
Liston, Peter

<120> MAMMALIAN IAP GENE FAMILY, PRIMERS,
PROBES, AND DETECTION METHODS

<130> 07891/003006

<150> US 09/011,356
<151> 1998-02-04

<150> PCT/IB96/01022
<151> 1996-08-05

<150> US 08/576,956
<151> 1995-12-22

<150> US 08/511,485
<151> 1995-08-04

<160> 45

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<220>
<223> Synthetic based on Homo sapiens, Mus musculus,
Drosophila melanogaster, Cydia pomonella, and
Orgyia pseudotsugata

<221> VARIANT
<222> (2)...(45)
<223> Xaa at positions 2, 3, 4, 5, 6, 7, 9, 10, 11, 17,
18, 19, 20, 21, 23, 25, 30, 31, 32, 34, 35, 38,
39, 40, 41, 42, and 45 may be any amino acid.

<221> VARIANT
<222> (8)...(8)
<223> Xaa at position 8 is Glu or Asp.

<221> VARIANT
<222> (14)...(14)
<223> Xaa at position 14 is Val or Ile.

<221> VARIANT
<222> (22)...(22)
<223> Xaa at position 22 is Val or Ile.

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Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe Xaa Pro Cys Gly His Xaa Xaa Xaa
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Cys Xaa Xaa Cys Ala Xaa Xaa Xaa Xaa Xaa Cys Pro Xaa Cys
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<212> PRT
<213> Artificial Sequence

<220>
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19, 20, 21, 24, 30, 32, 33, 35, 37, 40, 42, 43,
44, 45, 46, 47, 49, 50, 51, 53, 54, 55, 56, 57,
59, 60, 61, 62, 64 and 66 may be any amino acid.

<221> VARIANT
<222> (13)...(17)
<223> Xaa at positions 13, 16 and 17 may be any amino
acid or may be absent.

<223> Synthetic based on Homo sapiens, Mus musculus,
Drosophila melanogaster, Cydia pomonella, and
Orgyia pseudotsugata

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Xaa Xaa Xaa Xaa Xaa Leu Ala Xaa Ala Gly Phe Tyr Tyr Xaa Gly Xaa
            20   25   30
Xaa Asp Xaa Val Xaa Cys Phe Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Trp
        35   40   45
Xaa Xaa Xaa Asp Xaa Xaa Xaa Xaa Xaa His Xaa Xaa Xaa Xaa Pro Xaa
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Cys Xaa Phe Val
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<210> 3
<211> 2540
<212> DNA
<213> Homo sapiens

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<222> (2540)...(2540)
<223> N may be any nucleotide

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ttaaaaactt ttgctaattt tccaagtggt agtcctgttt cagcatcaac actggcacga 180
gcagggtttc tttatactgg tgaaggagat accgtgcggt gctttagttg tcatgcagct 240
gtagatagat ggcaatatgg agactcagca gttggaagac acaggaaagt atccccaaat 300

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gacaggccat ctgagacaca tgcagactat cttttgagaa ctgggcaggt tgtagatata     480
tcagacacca tatacccgag gaaccctgcc atgtattgtg aagaagctag attaaagtcc     540
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tactacacag gtattggtga ccaagtgcag tgcttttgtt gtggtggaaa actgaaaaat     660
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<212> PRT
<213> Homo sapiens

<400> 4

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Phe Ala Asn Phe Pro Ser Gly Ser Pro Val Ser Ala Ser Thr Leu Ala
        35                  40                  45
Arg Ala Gly Phe Leu Tyr Thr Gly Glu Gly Asp Thr Val Arg Cys Phe
    50                  55                  60
Ser Cys His Ala Ala Val Asp Arg Trp Gln Tyr Gly Asp Ser Ala Val
65                  70                  75                  80
Gly Arg His Arg Lys Val Ser Pro Asn Cys Arg Phe Ile Asn Gly Phe
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Tyr Leu Glu Asn Ser Ala Thr Gln Ser Thr Asn Ser Gly Ile Gln Asn
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Gln Val Val Asp Ile Ser Asp Thr Ile Tyr Pro Arg Asn Pro Ala Met
145                 150                 155                 160
Tyr Cys Glu Glu Ala Arg Leu Lys Ser Phe Gln Asn Trp Pro Asp Tyr
                165                 170                 175
Ala His Leu Thr Pro Arg Glu Leu Ala Ser Ala Gly Leu Tyr Tyr Thr
            180                 185                 190
Gly Ile Gly Asp Gln Val Gln Cys Phe Cys Cys Gly Gly Lys Leu Lys
        195                 200                 205
Asn Trp Glu Pro Cys Asp Arg Ala Trp Ser Glu His Arg Arg His Phe
    210                 215                 220
Pro Asn Cys Phe Phe Val Leu Gly Arg Asn Leu Asn Ile Arg Ser Glu
225                 230                 235                 240
Ser Asp Ala Val Ser Ser Asp Arg Asn Phe Pro Asn Ser Thr Asn Leu
                245                 250                 255
Pro Arg Asn Pro Ser Met Ala Asp Tyr Glu Ala Arg Ile Phe Thr Phe
            260                 265                 270
Gly Thr Trp Ile Tyr Ser Val Asn Lys Glu Gln Leu Ala Arg Ala Gly
        275                 280                 285
Phe Tyr Ala Leu Gly Glu Gly Asp Lys Val Lys Cys Phe His Cys Gly
    290                 295                 300
Gly Gly Leu Thr Asp Trp Lys Pro Ser Glu Asp Pro Trp Glu Gln His
305                 310                 315                 320
Ala Lys Trp Tyr Pro Gly Cys Lys Tyr Leu Leu Glu Gln Lys Gly Gln
                325                 330                 335
Glu Tyr Ile Asn Asn Ile His Leu Thr His Ser Leu Glu Glu Cys Leu
            340                 345                 350
Val Arg Thr Thr Glu Lys Thr Pro Ser Leu Thr Arg Arg Ile Asp Asp
        355                 360                 365
Thr Ile Phe Gln Asn Pro Met Val Gln Glu Ala Ile Arg Met Gly Phe
    370                 375                 380
Ser Phe Lys Asp Ile Lys Lys Ile Met Glu Glu Lys Ile Gln Ile Ser
385                 390                 395                 400
Gly Ser Asn Tyr Lys Ser Leu Glu Val Leu Val Ala Asp Leu Val Asn
                405                 410                 415
Ala Gln Lys Asp Ser Met Gln Asp Glu Ser Ser Gln Thr Ser Leu Gln
            420                 425                 430
Lys Glu Ile Ser Thr Glu Glu Gln Leu Arg Arg Leu Gln Glu Glu Lys
        435                 440                 445
Leu Cys Lys Ile Cys Met Asp Arg Asn Ile Ala Ile Val Phe Val Pro
    450                 455                 460
Cys Gly His Leu Val Thr Cys Lys Gln Cys Ala Glu Ala Val Asp Lys
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Cys Pro Met Cys Tyr Thr Val Ile Thr Phe Lys Gln Lys Ile Phe Met
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<223> N may be any nucleotide

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acacgtttga actgaaatac gacttgtcat gtgaactgta ccgaatgtct acgtattcca 300
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<212> PRT
<213> Homo sapiens

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        35                  40                  45
Ser Leu Ala Arg Ala Gly Phe Tyr Tyr Thr Gly Val Asn Asp Lys Val
    50                  55                  60
Lys Cys Phe Cys Cys Gly Leu Met Leu Asp Asn Trp Lys Arg Gly Asp
65                  70                  75                  80
Ser Pro Thr Glu Lys His Lys Lys Leu Tyr Pro Ser Cys Arg Phe Val
                85                  90                  95
Gln Ser Leu Asn Ser Val Asn Asn Leu Glu Ala Thr Ser Gln Pro Thr
            100                 105                 110
Phe Pro Ser Ser Val Thr His Ser Thr His Ser Leu Leu Pro Gly Thr
        115                 120                 125
Glu Asn Ser Gly Tyr Phe Arg Gly Ser Tyr Ser Asn Ser Pro Ser Asn
    130                 135                 140
Pro Val Asn Ser Arg Ala Asn Gln Glu Phe Ser Ala Leu Met Arg Ser
145                 150                 155                 160
Ser Tyr Pro Cys Pro Met Asn Asn Glu Asn Ala Arg Leu Leu Thr Phe
                165                 170                 175
Gln Thr Trp Pro Leu Thr Phe Leu Ser Pro Thr Asp Leu Ala Arg Ala
            180                 185                 190
Gly Phe Tyr Tyr Ile Gly Pro Gly Asp Arg Val Ala Cys Phe Ala Cys
        195                 200                 205
Gly Gly Lys Leu Ser Asn Trp Glu Pro Lys Asp Asn Ala Met Ser Glu
    210                 215                 220
His Leu Arg His Phe Pro Lys Cys Pro Phe Ile Glu Asn Gln Leu Gln
225                 230                 235                 240
Asp Thr Ser Arg Tyr Thr Val Ser Asn Leu Ser Met Gln Thr His Ala
                245                 250                 255
Ala Arg Phe Lys Thr Phe Phe Asn Trp Pro Ser Ser Val Leu Val Asn
            260                 265                 270
Pro Glu Gln Leu Ala Ser Ala Gly Phe Tyr Tyr Val Gly Asn Ser Asp
        275                 280                 285
Asp Val Lys Cys Phe Cys Cys Asp Gly Gly Leu Arg Cys Trp Glu Ser
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Gly Asp Asp Pro Trp Val Gln His Ala Lys Trp Phe Pro Arg Cys Glu
305                 310                 315                 320
Tyr Leu Ile Arg Ile Lys Gly Gln Glu Phe Ile Arg Gln Val Gln Ala
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Ser Tyr Pro His Leu Leu Glu Gln Leu Leu Ser Thr Ser Asp Ser Pro
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Gly Asp Glu Asn Ala Glu Ser Ser Ile Ile His Leu Glu Pro Gly Glu
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Asp His Ser Glu Asp Ala Ile Met Met Asn Thr Pro Val Ile Asn Ala
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Ala Val Glu Met Gly Phe Ser Arg Ser Leu Val Lys Gln Thr Val Gln
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Arg Lys Ile Leu Ala Thr Gly Glu Asn Tyr Arg Leu Val Asn Asp Leu
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Val Leu Asp Leu Leu Asn Ala Glu Asp Glu Ile Arg Glu Glu Glu Arg
            420                 425                 430
Glu Arg Ala Thr Glu Glu Lys Glu Ser Asn Asp Leu Leu Leu Ile Arg
        435                 440                 445
Lys Asn Arg Met Ala Leu Phe Gln His Leu Thr Cys Val Ile Pro Ile
    450                 455                 460
Leu Asp Ser Leu Leu Thr Ala Gly Ile Ile Asn Glu Gln Glu His Asp
465                 470                 475                 480
Val Ile Lys Gln Lys Thr Gln Thr Ser Leu Gln Ala Arg Glu Leu Ile
                485                 490                 495
Asp Thr Ile Leu Val Lys Gly Asn Ile Ala Ala Thr Val Phe Arg Asn
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Ser Leu Gln Glu Ala Glu Ala Val Leu Tyr Glu His Leu Phe Val Gln
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Gln Asp Ile Lys Tyr Ile Pro Thr Glu Asp Val Ser Asp Leu Pro Val
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Glu Glu Gln Leu Arg Arg Leu Pro Glu Glu Arg Thr Cys Lys Val Cys
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Met Asp Lys Glu Val Ser Ile Val Phe Ile Pro Cys Gly His Leu Val
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<223> N may be any nucleotide

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<212> PRT
<213> Homo sapiens

<400> 8

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Met His Lys Thr Ala Ser Gln Arg Leu Phe Pro Gly Pro Ser Tyr Gln
 1               5                  10                  15
Asn Ile Lys Ser Ile Met Glu Asp Ser Thr Ile Leu Ser Asp Trp Thr
            20                  25                  30
Asn Ser Asn Lys Gln Lys Met Lys Tyr Asp Phe Ser Cys Glu Leu Tyr
        35                  40                  45
Arg Met Ser Thr Tyr Ser Thr Phe Pro Ala Gly Val Pro Val Ser Glu
    50                  55                  60
Arg Ser Leu Ala Arg Ala Gly Phe Tyr Tyr Thr Gly Val Asn Asp Lys
65                  70                  75                  80
Val Lys Cys Phe Cys Cys Gly Leu Met Leu Asp Asn Trp Lys Leu Gly
                85                  90                  95
Asp Ser Pro Ile Gln Lys His Lys Gln Leu Tyr Pro Ser Cys Ser Phe
            100                 105                 110
Ile Gln Asn Leu Val Ser Ala Ser Leu Gly Ser Thr Ser Lys Asn Thr
        115                 120                 125
Ser Pro Met Arg Asn Ser Phe Ala His Ser Leu Ser Pro Thr Leu Glu
    130                 135                 140
His Ser Ser Leu Phe Ser Gly Ser Tyr Ser Ser Leu Pro Pro Asn Pro
145                 150                 155                 160
Leu Asn Ser Arg Ala Val Glu Asp Ile Ser Ser Ser Arg Thr Asn Pro
                165                 170                 175
Tyr Ser Tyr Ala Met Ser Thr Glu Glu Ala Arg Phe Leu Thr Tyr His
            180                 185                 190
Met Trp Pro Leu Thr Phe Leu Ser Pro Ser Glu Leu Ala Arg Ala Gly
        195                 200                 205
Phe Tyr Tyr Ile Gly Pro Gly Asp Arg Val Ala Cys Phe Ala Cys Gly
    210                 215                 220
```

```
Gly Lys Leu Ser Asn Trp Glu Pro Lys Asp Asp Ala Met Ser Glu His
225                 230                 235                 240
Arg Arg His Phe Pro Asn Cys Pro Phe Leu Glu Asn Ser Leu Glu Thr
                245                 250                 255
Leu Arg Phe Ser Ile Ser Asn Leu Ser Met Gln Thr His Ala Ala Arg
            260                 265                 270
Met Arg Thr Phe Met Tyr Trp Pro Ser Ser Val Pro Val Gln Pro Glu
        275                 280                 285
Gln Leu Ala Ser Ala Gly Phe Tyr Tyr Val Gly Arg Asn Asp Asp Val
    290                 295                 300
Lys Cys Phe Gly Cys Asp Gly Gly Leu Arg Cys Trp Glu Ser Gly Asp
305                 310                 315                 320
Asp Pro Trp Val Glu His Ala Lys Trp Phe Pro Arg Cys Glu Phe Leu
                325                 330                 335
Ile Arg Met Lys Gly Gln Glu Phe Val Asp Glu Ile Gln Gly Arg Tyr
            340                 345                 350
Pro His Leu Leu Glu Gln Leu Leu Ser Thr Ser Asp Thr Thr Gly Glu
        355                 360                 365
Glu Asn Ala Asp Pro Pro Ile Ile His Phe Gly Pro Gly Glu Ser Ser
    370                 375                 380
Ser Glu Asp Ala Val Met Met Asn Thr Pro Val Val Lys Ser Ala Leu
385                 390                 395                 400
Glu Met Gly Phe Asn Arg Asp Leu Val Lys Gln Thr Val Leu Ser Lys
                405                 410                 415
Ile Leu Thr Thr Gly Glu Asn Tyr Lys Thr Val Asn Asp Ile Val Ser
            420                 425                 430
Ala Leu Leu Asn Ala Glu Asp Glu Lys Arg Glu Glu Glu Lys Glu Lys
        435                 440                 445
Gln Ala Glu Glu Met Ala Ser Asp Asp Leu Ser Leu Ile Arg Lys Asn
    450                 455                 460
Arg Met Ala Leu Phe Gln Gln Leu Thr Cys Val Leu Pro Ile Leu Asp
465                 470                 475                 480
Asn Leu Leu Lys Ala Asn Val Ile Asn Lys Gln Glu His Asp Ile Ile
                485                 490                 495
Lys Gln Lys Thr Gln Ile Pro Leu Gln Ala Arg Glu Leu Ile Asp Thr
            500                 505                 510
Ile Trp Val Lys Gly Asn Ala Ala Ala Asn Ile Phe Lys Asn Cys Leu
        515                 520                 525
Lys Glu Ile Asp Ser Thr Leu Tyr Lys Asn Leu Phe Val Asp Lys Asn
    530                 535                 540
Met Lys Tyr Ile Pro Thr Glu Asp Val Ser Gly Leu Ser Leu Glu Glu
545                 550                 555                 560
Gln Leu Arg Arg Leu Gln Glu Glu Arg Thr Cys Lys Val Cys Met Asp
                565                 570                 575
Lys Glu Val Ser Val Val Phe Ile Pro Cys Gly His Leu Val Val Cys
            580                 585                 590
Gln Glu Cys Ala Pro Ser Leu Arg Lys Cys Pro Ile Cys Arg Gly Ile
        595                 600                 605
Ile Lys Gly Thr Val Arg Thr Phe Leu Ser
    610                 615
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<210> 9
<211> 2100
<212> DNA
<213> Mus musculus

<400> 9
gacactctgc tgggcggcgg gccgccctcc tccgggacct cccctcggga accgtcgccc 60

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gcggcgctta gttaggactg gagtgcttgg cgcgaaaagg tggacaagtc ctattttcca     120
gagaagatga cttttaacag ttttgaagga actagaactt ttgtacttgc agacaccaat     180
aaggatgaag aatttgtaga agagtttaat agattaaaaa catttgctaa cttcccaagt     240
agtagtcctg tttcagcatc aacattggcg cgagctgggt ttctttatac cggtgaagga     300
gacaccgtgc aatgtttcag ttgtcatgcg gcaatagata gatggcagta tggagactca     360
gctgttggaa gacacaggag aatatcccca aattgcagat ttatcaatgg tttttatttt     420
gaaaatggtg ctgcacagtc tacaaatcct ggtatccaaa atggccagta caaatctgaa     480
aactgtgtgg gaaatagaaa tccttttgcc cctgacaggc cacctgagac tcatgctgat     540
tatctcttga gaactggaca ggttgtagat atttcagaca ccatataccc gaggaaccct     600
gccatgtgta gtgaagaagc cagattgaag tcatttcaga actggccgga ctatgctcat     660
ttaaccccca gagagttagc tagtgctggc ctctactaca caggggctga tgatcaagtg     720
caatgctttt gttgtggggg aaaactgaaa aattgggaac cctgtgatcg tgcctggtca     780
gaacacagga gacactttcc caattgcttt tttgttttgg gccggaacgt taatgttcga     840
agtgaatctg gtgtgagttc tgataggaat ttcccaaatt caacaaactc tccaagaaat     900
ccagccatgg cagaatatga agcacggatc gttacttttg gaacatggat atactcagtt     960
aacaaggagc agcttgcaag agctggattt tatgctttag gtgaaggcga taaagtgaag    1020
tgcttccact gtggaggagg gctcacggat tggaagccaa gtgaagaccc ctgggaccag    1080
catgctaagt gctacccagg gtgcaaatac ctattggatg agaaggggca agaatatata    1140
aataatattc atttaaccca tccacttgag gaatctttgg gaagaactgc tgaaaaaaca    1200
ccaccgctaa ctaaaaaaat cgatgatacc atcttccaga atcctatggt gcaagaagct    1260
atacgaatgg gatttagctt caaggacctt aagaaaacaa tggaagaaaa aatccaaaca    1320
tccgggagca gctatctatc acttgaggtc ctgattgcag atcttgtgag tgctcagaaa    1380
gataatacgg aggatgagtc aagtcaaact tcattgcaga aagacattag tactgaagag    1440
cagctaaggc gcctacaaga ggagaagctt tccaaaatct gtatggatag aaatattgct    1500
atcgtttttt ttccttgtgg acatctggcc acttgtaaac agtgtgcaga agcagttgac    1560
aaatgtccca tgtgctacac cgtcattacg ttcaaccaaa aaatttttat gtcttagtgg    1620
ggcaccacat gttatgttct tcttgctcta attgaatgtg taatgggagc gaactttaag    1680
taatcctgca tttgcattcc attagcatcc tgctgtttcc aaatggagac caatgctaac    1740
agcactgttt ccgtctaaac attcaatttc tggatctttc gagttatcag ctgtatcatt    1800
tagccagtgt tttactcgat tgaaacctta gacagagaag cattttatag cttttcacat    1860
gtatattggt agtacactga cttgatttct atatgtaagt gaattcatca cctgcatgtt    1920
tcatgccttt tgcataagct taacaaatgg agtgttctgt ataagcatgg agatgtgatg    1980
gaatctgccc aatgacttta attggcttat tgtaaacacg gaaagaactg ccccacgctg    2040
ctgggaggat aaagattgtt ttagatgctc acttctgtgt tttaggattc tgcccattta    2100
```

<210> 10
<211> 496
<212> PRT
<213> Mus musculus

<400> 10

```
Met Thr Phe Asn Ser Phe Glu Gly Thr Arg Thr Phe Val Leu Ala Asp
 1               5                  10                  15
Thr Asn Lys Asp Glu Glu Phe Val Glu Glu Phe Asn Arg Leu Lys Thr
            20                  25                  30
Phe Ala Asn Phe Pro Ser Ser Ser Pro Val Ser Ala Ser Thr Leu Ala
        35                  40                  45
Arg Ala Gly Phe Leu Tyr Thr Gly Glu Gly Asp Thr Val Gln Cys Phe
    50                  55                  60
Ser Cys His Ala Ala Ile Asp Arg Trp Gln Tyr Gly Asp Ser Ala Val
65                  70                  75                  80
Gly Arg His Arg Arg Ile Ser Pro Asn Cys Arg Phe Ile Asn Gly Phe
                85                  90                  95
Tyr Phe Glu Asn Gly Ala Ala Gln Ser Thr Asn Pro Gly Ile Gln Asn
            100                 105                 110
Gly Gln Tyr Lys Ser Glu Asn Cys Val Gly Asn Arg Asn Pro Phe Ala
        115                 120                 125
Pro Asp Arg Pro Pro Glu Thr His Ala Asp Tyr Leu Leu Arg Thr Gly
```

```
    130                 135                 140
Gln Val Val Asp Ile Ser Asp Thr Ile Tyr Pro Arg Asn Pro Ala Met
145                 150                 155                 160
Cys Ser Glu Glu Ala Arg Leu Lys Ser Phe Gln Asn Trp Pro Asp Tyr
                165                 170                 175
Ala His Leu Thr Pro Arg Glu Leu Ala Ser Ala Gly Leu Tyr Tyr Thr
            180                 185                 190
Gly Ala Asp Asp Gln Val Gln Cys Phe Cys Cys Gly Gly Lys Leu Lys
        195                 200                 205
Asn Trp Glu Pro Cys Asp Arg Ala Trp Ser Glu His Arg Arg His Phe
    210                 215                 220
Pro Asn Cys Phe Phe Val Leu Gly Arg Asn Val Asn Val Arg Ser Glu
225                 230                 235                 240
Ser Gly Val Ser Ser Asp Arg Asn Phe Pro Asn Ser Thr Asn Ser Pro
                245                 250                 255
Arg Asn Pro Ala Met Ala Glu Tyr Glu Ala Arg Ile Val Thr Phe Gly
            260                 265                 270
Thr Trp Ile Tyr Ser Val Asn Lys Glu Gln Leu Ala Arg Ala Gly Phe
        275                 280                 285
Tyr Ala Leu Gly Glu Gly Asp Lys Val Lys Cys Phe His Cys Gly Gly
    290                 295                 300
Gly Leu Thr Asp Trp Lys Pro Ser Glu Asp Pro Trp Asp Gln His Ala
305                 310                 315                 320
Lys Cys Tyr Pro Gly Cys Lys Tyr Leu Leu Asp Glu Lys Gly Gln Glu
                325                 330                 335
Tyr Ile Asn Asn Ile His Leu Thr His Pro Leu Glu Glu Ser Leu Gly
            340                 345                 350
Arg Thr Ala Glu Lys Thr Pro Pro Leu Thr Lys Lys Ile Asp Asp Thr
        355                 360                 365
Ile Phe Gln Asn Pro Met Val Gln Glu Ala Ile Arg Met Gly Phe Ser
    370                 375                 380
Phe Lys Asp Leu Lys Lys Thr Met Glu Glu Lys Ile Gln Thr Ser Gly
385                 390                 395                 400
Ser Ser Tyr Leu Ser Leu Glu Val Leu Ile Ala Asp Leu Val Ser Ala
                405                 410                 415
Gln Lys Asp Asn Thr Glu Asp Glu Ser Ser Gln Thr Ser Leu Gln Lys
            420                 425                 430
Asp Ile Ser Thr Glu Glu Gln Leu Arg Arg Leu Gln Glu Glu Lys Leu
        435                 440                 445
Ser Lys Ile Cys Met Asp Arg Asn Ile Ala Ile Val Phe Phe Pro Cys
    450                 455                 460
Gly His Leu Ala Thr Cys Lys Gln Cys Ala Glu Ala Val Asp Lys Cys
465                 470                 475                 480
Pro Met Cys Tyr Thr Val Ile Thr Phe Asn Gln Lys Ile Phe Met Ser
                485                 490                 495
```

<210> 11
<211> 67
<212> PRT
<213> Orgyia pseudotsugata

<400> 11

```
Lys Ala Ala Arg Leu Gly Thr Tyr Thr Asn Trp Pro Val Gln Phe Leu
 1               5                  10                  15
Glu Pro Ser Arg Met Ala Ala Ser Gly Phe Tyr Tyr Leu Gly Arg Gly
            20                  25                  30
Asp Glu Val Arg Cys Ala Phe Cys Lys Val Glu Ile Thr Asn Trp Val
        35                  40                  45
```

```
Arg Gly Asp Asp Pro Glu Thr Asp His Lys Arg Trp Ala Pro Gln Cys
    50                  55                  60
Pro Phe Val
65
```

<210> 12
<211> 275
<212> PRT
<213> Cydia pomonella

<400> 12

```
Met Ser Asp Leu Arg Leu Glu Glu Val Arg Leu Asn Thr Phe Glu Lys
 1               5                  10                  15
Trp Pro Val Ser Phe Leu Ser Pro Glu Thr Met Ala Lys Asn Gly Phe
            20                  25                  30
Tyr Tyr Leu Gly Arg Ser Asp Glu Val Arg Cys Ala Phe Cys Lys Val
        35                  40                  45
Glu Ile Met Arg Trp Lys Glu Gly Glu Asp Pro Ala Ala Asp His Lys
    50                  55                  60
Lys Trp Ala Pro Gln Cys Pro Phe Val Lys Gly Ile Asp Val Cys Gly
65                  70                  75                  80
Ser Ile Val Thr Thr Asn Asn Ile Gln Asn Thr Thr Thr His Asp Thr
                85                  90                  95
Ile Ile Gly Pro Ala His Pro Lys Tyr Ala His Glu Ala Ala Arg Val
            100                 105                 110
Lys Ser Phe His Asn Trp Pro Arg Cys Met Lys Gln Arg Pro Glu Gln
        115                 120                 125
Met Ala Asp Ala Gly Phe Phe Tyr Thr Gly Tyr Gly Asp Asn Thr Lys
    130                 135                 140
Cys Phe Tyr Cys Asp Gly Gly Leu Lys Asp Trp Glu Pro Glu Asp Val
145                 150                 155                 160
Pro Trp Glu Gln His Val Arg Trp Phe Asp Arg Cys Ala Tyr Val Gln
                165                 170                 175
Leu Val Lys Gly Arg Asp Tyr Val Gln Lys Val Ile Thr Glu Ala Cys
            180                 185                 190
Val Leu Pro Gly Glu Asn Thr Thr Val Ser Thr Ala Ala Pro Val Ser
        195                 200                 205
Glu Pro Ile Pro Glu Thr Lys Ile Glu Lys Glu Pro Gln Val Glu Asp
    210                 215                 220
Ser Lys Leu Cys Lys Ile Cys Tyr Val Glu Glu Cys Ile Val Cys Phe
225                 230                 235                 240
Val Pro Cys Gly His Val Val Ala Cys Ala Lys Cys Ala Leu Ser Val
                245                 250                 255
Asp Lys Cys Pro Met Cys Arg Lys Ile Val Thr Ser Val Leu Lys Val
            260                 265                 270
Tyr Phe Ser
        275
```

<210> 13
<211> 498
<212> PRT
<213> Drosophila melanogaster

<400> 13

```
Met Thr Glu Leu Gly Met Glu Leu Glu Ser Val Arg Leu Ala Thr Phe
 1               5                  10                  15
Gly Glu Trp Pro Leu Asn Ala Pro Val Ser Ala Glu Asp Leu Val Ala
```

```
                20                  25                  30
Asn Gly Phe Phe Ala Thr Gly Lys Trp Leu Glu Ala Glu Cys His Phe
        35                  40                  45
Cys His Val Arg Ile Asp Arg Trp Glu Tyr Gly Asp Gln Val Ala Glu
    50                  55                  60
Arg His Arg Arg Ser Ser Pro Ile Cys Ser Met Val Leu Ala Pro Asn
65                  70                  75                  80
His Cys Gly Asn Val Pro Arg Ser Gln Glu Ser Asp Asn Glu Gly Asn
                85                  90                  95
Ser Val Val Asp Ser Pro Glu Ser Cys Ser Cys Pro Asp Leu Leu Leu
            100                 105                 110
Glu Ala Asn Arg Leu Val Thr Phe Lys Asp Trp Pro Asn Pro Asn Ile
        115                 120                 125
Thr Pro Gln Ala Leu Ala Lys Ala Gly Phe Tyr Tyr Leu Asn Arg Leu
    130                 135                 140
Asp His Val Lys Cys Val Trp Cys Asn Gly Val Ile Ala Lys Trp Glu
145                 150                 155                 160
Lys Asn Asp Asn Ala Phe Glu Glu His Lys Arg Phe Phe Pro Gln Cys
                165                 170                 175
Pro Arg Val Gln Met Gly Pro Leu Ile Glu Phe Ala Thr Gly Lys Asn
            180                 185                 190
Leu Asp Glu Leu Gly Ile Gln Pro Thr Thr Leu Pro Leu Arg Pro Lys
        195                 200                 205
Tyr Ala Cys Val Asp Ala Arg Leu Arg Thr Phe Thr Asp Trp Pro Ile
    210                 215                 220
Ser Asn Ile Gln Pro Ala Ser Ala Leu Ala Gln Ala Gly Leu Tyr Tyr
225                 230                 235                 240
Gln Lys Ile Gly Asp Gln Val Arg Cys Phe His Cys Asn Ile Gly Leu
                245                 250                 255
Arg Ser Trp Gln Lys Glu Asp Glu Pro Trp Phe Glu His Ala Lys Trp
            260                 265                 270
Ser Pro Lys Cys Gln Phe Val Leu Leu Ala Lys Gly Pro Ala Tyr Val
        275                 280                 285
Ser Glu Val Leu Ala Thr Thr Ala Ala Asn Ala Ser Ser Gln Pro Ala
    290                 295                 300
Thr Ala Pro Ala Pro Thr Leu Gln Ala Asp Val Leu Met Asp Glu Ala
305                 310                 315                 320
Pro Ala Lys Glu Ala Leu Thr Leu Gly Ile Asp Gly Gly Val Val Arg
                325                 330                 335
Asn Ala Ile Gln Arg Lys Leu Leu Ser Ser Gly Cys Ala Phe Ser Thr
            340                 345                 350
Leu Asp Glu Leu Leu His Asp Ile Phe Asp Asp Ala Gly Ala Gly Ala
        355                 360                 365
Ala Leu Glu Val Arg Glu Pro Pro Glu Pro Ser Ala Pro Phe Ile Glu
    370                 375                 380
Pro Cys Gln Ala Thr Thr Ser Lys Ala Ala Ser Val Pro Ile Pro Val
385                 390                 395                 400
Ala Asp Ser Ile Pro Ala Lys Pro Gln Ala Ala Glu Ala Val Ser Asn
                405                 410                 415
Ile Ser Lys Ile Thr Asp Glu Ile Gln Lys Met Ser Val Ser Thr Pro
            420                 425                 430
Asn Gly Asn Leu Ser Leu Glu Glu Glu Asn Arg Gln Leu Lys Asp Ala
        435                 440                 445
Arg Leu Cys Lys Val Cys Leu Asp Glu Glu Val Gly Val Val Phe Leu
    450                 455                 460
Pro Cys Gly His Leu Ala Thr Cys Asn Gln Cys Ala Pro Ser Val Ala
465                 470                 475                 480
Asn Cys Pro Met Cys Arg Ala Asp Ile Lys Gly Phe Val Arg Thr Phe
                485                 490                 495
```

Leu Ser

<210> 14
<211> 67
<212> PRT
<213> Cydia pomonella

<400> 14
Glu Glu Val Arg Leu Asn Thr Phe Glu Lys Trp Pro Val Ser Phe Leu
 1   5   10   15
Ser Pro Glu Thr Met Ala Lys Asn Gly Phe Tyr Tyr Leu Gly Arg Ser
            20   25   30
Asp Glu Val Arg Cys Ala Phe Cys Lys Val Glu Ile Met Arg Trp Lys
        35   40   45
Glu Gly Glu Asp Pro Ala Ala Asp His Lys Lys Trp Ala Pro Gln Cys
    50   55   60
Pro Phe Val
65

<210> 15
<211> 67
<212> PRT
<213> Drosophila melanogaster

<400> 15
Glu Ala Asn Arg Leu Val Thr Phe Lys Asp Trp Pro Asn Pro Asn Ile
 1   5   10   15
Thr Pro Gln Ala Leu Ala Lys Ala Gly Phe Tyr Tyr Leu Asn Arg Leu
            20   25   30
Asp His Val Lys Cys Val Trp Cys Asn Gly Val Ile Ala Lys Trp Glu
        35   40   45
Lys Asn Asp Asn Ala Phe Glu Glu His Lys Arg Phe Phe Pro Gln Cys
    50   55   60
Pro Arg Val
65

<210> 16
<211> 68
<212> PRT
<213> Mus musculus

<400> 16
Glu Phe Asn Arg Leu Lys Thr Phe Ala Asn Phe Pro Ser Ser Ser Pro
 1   5   10   15
Val Ser Ala Ser Thr Leu Ala Arg Ala Gly Phe Leu Tyr Thr Gly Glu
            20   25   30
Gly Asp Thr Val Gln Cys Phe Ser Cys His Ala Ala Ile Asp Arg Trp
        35   40   45
Gln Tyr Gly Asp Ser Ala Val Gly Arg His Arg Arg Ile Ser Pro Asn
    50   55   60
Cys Arg Phe Ile
65

<210> 17

<211> 68
<212> PRT
<213> Homo sapiens

<400> 17
Glu Phe Asn Arg Leu Lys Thr Phe Ala Asn Phe Pro Ser Gly Ser Pro
 1   5   10   15
Val Ser Ala Ser Thr Leu Ala Arg Ala Gly Phe Leu Tyr Thr Gly Glu
            20   25   30
Gly Asp Thr Val Arg Cys Phe Ser Cys His Ala Ala Val Asp Arg Trp
        35   40   45
Gln Tyr Gly Asp Ser Ala Val Gly Arg His Arg Lys Val Ser Pro Asn
    50   55   60
Cys Arg Phe Ile
65

<210> 18
<211> 68
<212> PRT
<213> Homo sapiens

<400> 18
Glu Leu Tyr Arg Met Ser Thr Tyr Ser Thr Phe Pro Ala Gly Val Pro
 1   5   10   15
Val Ser Glu Arg Ser Leu Ala Arg Ala Gly Phe Tyr Tyr Thr Gly Val
            20   25   30
Asn Asp Lys Val Lys Cys Phe Cys Cys Gly Leu Met Leu Asp Asn Trp
        35   40   45
Lys Arg Gly Asp Ser Pro Thr Glu Lys His Lys Lys Leu Tyr Pro Ser
    50   55   60
Cys Arg Phe Val
65

<210> 19
<211> 68
<212> PRT
<213> Homo sapiens

<400> 19
Glu Leu Tyr Arg Met Ser Thr Tyr Ser Thr Phe Pro Ala Gly Val Pro
 1   5   10   15
Val Ser Glu Arg Ser Leu Ala Arg Ala Gly Phe Tyr Tyr Thr Gly Val
            20   25   30
Asn Asp Lys Val Lys Cys Phe Cys Cys Gly Leu Met Leu Asp Asn Trp
        35   40   45
Lys Leu Gly Asp Ser Pro Ile Gln Lys His Lys Gln Leu Tyr Pro Ser
    50   55   60
Cys Ser Phe Ile
65

<210> 20
<211> 68
<212> PRT
<213> Mus musculus

<400> 20

```
Glu Glu Ala Arg Leu Lys Ser Phe Gln Asn Trp Pro Asp Tyr Ala His
 1               5                  10                  15
Leu Thr Pro Arg Glu Leu Ala Ser Ala Gly Leu Tyr Tyr Thr Gly Ala
            20                  25                  30
Asp Asp Gln Val Gln Cys Phe Cys Cys Gly Gly Lys Leu Lys Asn Trp
        35                  40                  45
Glu Pro Cys Asp Arg Ala Trp Ser Glu His Arg Arg His Phe Pro Asn
    50                  55                  60
Cys Phe Phe Val
65
```

<210> 21
<211> 68
<212> PRT
<213> Homo sapiens

<400> 21

```
Glu Glu Ala Arg Leu Lys Ser Phe Gln Asn Trp Pro Asp Tyr Ala His
 1               5                  10                  15
Leu Thr Pro Arg Glu Leu Ala Ser Ala Gly Leu Tyr Tyr Thr Gly Ile
            20                  25                  30
Gly Asp Gln Val Gln Cys Phe Cys Cys Gly Gly Lys Leu Lys Asn Trp
        35                  40                  45
Glu Pro Cys Asp Arg Ala Trp Ser Glu His Arg Arg His Phe Pro Asn
    50                  55                  60
Cys Phe Phe Val
65
```

<210> 22
<211> 67
<212> PRT
<213> Homo sapiens

<400> 22

```
Glu Asn Ala Arg Leu Leu Thr Phe Gln Thr Trp Pro Leu Thr Phe Leu
 1               5                  10                  15
Ser Pro Thr Asp Leu Ala Arg Ala Gly Phe Tyr Tyr Ile Gly Pro Gly
            20                  25                  30
Asp Arg Val Ala Cys Phe Ala Cys Gly Gly Lys Leu Ser Asn Trp Glu
        35                  40                  45
Pro Lys Asp Asn Ala Met Ser Glu His Leu Arg His Phe Pro Lys Cys
    50                  55                  60
Pro Phe Ile
65
```

<210> 23
<211> 67
<212> PRT
<213> Homo sapiens

<400> 23

```
Glu Glu Ala Arg Phe Leu Thr Tyr His Met Trp Pro Leu Thr Phe Leu
 1               5                  10                  15
Ser Pro Ser Glu Leu Ala Arg Ala Gly Phe Tyr Tyr Ile Gly Pro Gly
            20                  25                  30
Asp Arg Val Ala Cys Phe Ala Cys Gly Gly Lys Leu Ser Asn Trp Glu
```

```
        35                  40                  45
Pro Lys Asp Asp Ala Met Ser Glu His Arg Arg His Phe Pro Asn Cys
    50                  55                  60
Pro Phe Leu
65
```

<210> 24
<211> 66
<212> PRT
<213> Mus musculus

<400> 24

```
Tyr Glu Ala Arg Ile Val Thr Phe Gly Thr Trp Ile Tyr Ser Val Asn
 1               5                  10                  15
Lys Glu Gln Leu Ala Arg Ala Gly Phe Tyr Ala Leu Gly Glu Gly Asp
            20                  25                  30
Lys Val Lys Cys Phe His Cys Gly Gly Gly Leu Thr Asp Trp Lys Pro
        35                  40                  45
Ser Glu Asp Pro Trp Asp Gln His Ala Lys Cys Tyr Pro Gly Cys Lys
    50                  55                  60
Tyr Leu
65
```

<210> 25
<211> 66
<212> PRT
<213> Homo sapiens

<400> 25

```
Tyr Glu Ala Arg Ile Phe Thr Phe Gly Thr Trp Ile Tyr Ser Val Asn
 1               5                  10                  15
Lys Glu Gln Leu Ala Arg Ala Gly Phe Tyr Ala Leu Gly Glu Gly Asp
            20                  25                  30
Lys Val Lys Cys Phe His Cys Gly Gly Gly Leu Thr Asp Trp Lys Pro
        35                  40                  45
Ser Glu Asp Pro Trp Glu Gln His Ala Lys Trp Tyr Pro Gly Cys Lys
    50                  55                  60
Tyr Leu
65
```

<210> 26
<211> 68
<212> PRT
<213> Homo sapiens

<400> 26

```
His Ala Ala Arg Phe Lys Thr Phe Phe Asn Trp Pro Ser Ser Val Leu
 1               5                  10                  15
Val Asn Pro Glu Gln Leu Ala Ser Ala Gly Phe Tyr Tyr Val Gly Asn
            20                  25                  30
Ser Asp Asp Val Lys Cys Phe Cys Cys Asp Gly Gly Leu Arg Cys Trp
        35                  40                  45
Glu Ser Gly Asp Asp Pro Trp Val Gln His Ala Lys Trp Phe Pro Arg
    50                  55                  60
Cys Glu Tyr Leu
65
```

<210> 27
<211> 68
<212> PRT
<213> Homo sapiens

<400> 27
His Ala Ala Arg Met Arg Thr Phe Met Tyr Trp Pro Ser Ser Val Pro
 1   5   10   15
Val Gln Pro Glu Gln Leu Ala Ser Ala Gly Phe Tyr Tyr Val Gly Arg
            20   25   30
Asn Asp Asp Val Lys Cys Phe Gly Cys Asp Gly Gly Leu Arg Cys Trp
        35   40   45
Glu Ser Gly Asp Asp Pro Trp Val Glu His Ala Lys Trp Phe Pro Arg
    50   55   60
Cys Glu Phe Leu
65

<210> 28
<211> 68
<212> PRT
<213> Orgyia pseudotsugata

<400> 28
Glu Ala Ala Arg Leu Arg Thr Phe Ala Glu Trp Pro Arg Gly Leu Lys
 1   5   10   15
Gln Arg Pro Glu Glu Leu Ala Glu Ala Gly Phe Phe Tyr Thr Gly Gln
            20   25   30
Gly Asp Lys Thr Arg Cys Phe Cys Cys Asp Gly Gly Leu Lys Asp Trp
        35   40   45
Glu Pro Asp Asp Ala Pro Trp Gln Gln His Ala Arg Trp Tyr Asp Arg
    50   55   60
Cys Glu Tyr Val
65

<210> 29
<211> 68
<212> PRT
<213> Cydia pomonella

<400> 29
Glu Ala Ala Arg Val Lys Ser Phe His Asn Trp Pro Arg Cys Met Lys
 1   5   10   15
Gln Arg Pro Glu Gln Met Ala Asp Ala Gly Phe Phe Tyr Thr Gly Tyr
            20   25   30
Gly Asp Asn Thr Lys Cys Phe Tyr Cys Asp Gly Gly Leu Lys Asp Trp
        35   40   45
Glu Pro Glu Asp Val Pro Trp Glu Gln His Val Arg Trp Phe Asp Arg
    50   55   60
Cys Ala Tyr Val
65

<210> 30
<211> 68
<212> PRT
<213> Drosophila melanogaster

<400> 30
Val Asp Ala Arg Leu Arg Thr Phe Thr Asp Trp Pro Ile Ser Asn Ile
 1   5   10   15
Gln Pro Ala Ser Ala Leu Ala Gln Ala Gly Leu Tyr Tyr Gln Lys Ile
            20   25   30
Gly Asp Gln Val Arg Cys Phe His Cys Asn Ile Gly Leu Arg Ser Trp
        35   40   45
Gln Lys Glu Asp Glu Pro Trp Phe Glu His Ala Lys Trp Ser Pro Lys
    50   55   60
Cys Gln Phe Val
65

<210> 31
<211> 66
<212> PRT
<213> Drosophila melanogaster

<400> 31
Glu Ser Val Arg Leu Ala Thr Phe Gly Glu Trp Pro Leu Asn Ala Pro
 1   5   10   15
Val Ser Ala Glu Asp Leu Val Ala Asn Gly Phe Phe Gly Thr Trp Met
            20   25   30
Glu Ala Glu Cys Asp Phe Cys His Val Arg Ile Asp Arg Trp Glu Tyr
        35   40   45
Gly Asp Leu Val Ala Glu Arg His Arg Arg Ser Ser Pro Ile Cys Ser
    50   55   60
Met Val
65

<210> 32
<211> 46
<212> PRT
<213> Homo sapiens

<400> 32
Glu Gln Leu Arg Arg Leu Gln Glu Glu Arg Thr Cys Lys Val Cys Met
 1   5   10   15
Asp Lys Glu Val Ser Val Val Phe Ile Pro Cys Gly His Leu Val Val
            20   25   30
Cys Gln Glu Cys Ala Pro Ser Leu Arg Lys Cys Pro Ile Cys
        35   40   45

<210> 33
<211> 46
<212> PRT
<213> Homo sapiens

<400> 33
Glu Gln Leu Arg Arg Leu Pro Glu Glu Arg Thr Cys Lys Val Cys Met
 1   5   10   15
Asp Lys Glu Val Ser Ile Val Phe Ile Pro Cys Gly His Leu Val Val
            20   25   30
Cys Lys Asp Cys Ala Pro Ser Leu Arg Lys Cys Pro Ile Cys
        35   40   45

<210> 34
<211> 46
<212> PRT
<213> Mus musculus

<400> 34
Glu Gln Leu Arg Arg Leu Gln Glu Glu Lys Leu Ser Lys Ile Cys Met
 1   5   10   15
Asp Arg Asn Ile Ala Ile Val Phe Phe Pro Cys Gly His Leu Ala Thr
            20   25   30
Cys Lys Gln Cys Ala Glu Ala Val Asp Lys Cys Pro Met Cys
        35   40   45

<210> 35
<211> 46
<212> PRT
<213> Homo sapiens

<400> 35
Glu Gln Leu Arg Arg Leu Gln Glu Glu Lys Leu Cys Lys Ile Cys Met
 1   5   10   15
Asp Arg Asn Ile Ala Ile Val Phe Val Pro Cys Gly His Leu Val Thr
            20   25   30
Cys Lys Gln Cys Ala Glu Ala Val Asp Lys Cys Pro Met Cys
        35   40   45

<210> 36
<211> 46
<212> PRT
<213> Drosophila melanogaster

<400> 36
Glu Glu Asn Arg Gln Leu Lys Asp Ala Arg Leu Cys Lys Val Cys Leu
 1   5   10   15
Asp Glu Glu Val Gly Val Val Phe Leu Pro Cys Gly His Leu Ala Thr
            20   25   30
Cys Asn Gln Cys Ala Pro Ser Val Ala Asn Cys Pro Met Cys
        35   40   45

<210> 37
<211> 46
<212> PRT
<213> Cydia pomonella

<400> 37
Glu Lys Glu Pro Gln Val Glu Asp Ser Lys Leu Cys Lys Ile Cys Tyr
 1   5   10   15
Val Glu Glu Cys Ile Val Cys Phe Val Pro Cys Gly His Val Val Ala
            20   25   30
Cys Ala Lys Cys Ala Leu Ser Val Asp Lys Cys Pro Met Cys
        35   40   45

<210> 38
<211> 46
<212> PRT

<213> Orgyia pseudotsugata

<400> 38

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Ala Val Glu Ala Glu Val Ala Asp Asp Arg Leu Cys Lys Ile Cys Leu
 1               5                  10                  15
Gly Ala Glu Lys Thr Val Cys Phe Val Pro Cys Gly His Val Val Ala
            20                  25                  30
Cys Gly Lys Cys Ala Ala Gly Val Thr Thr Cys Pro Val Cys
        35                  40                  45
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<210> 39
<211> 2474
<212> DNA
<213> Mus musculus

<400> 39

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gaattccggg agacctacac ccccggagat cagaggtcat tgctggcgtt cagagcctag      60
gaagtgggct gcggtatcag cctagcagta aaaccgacca gaagccatgc acaaaactac     120
atccccagag aaagacttgt cccttcccct ccctgtcatc tcaccatgaa catggttcaa     180
gacagcgcct ttctagccaa gctgatgaag agtgctgaca cctttgagtt gaagtatgac     240
ttttcctgtg agctgtaccg attgtccacg tattcagctt ttcccagggg agttcctgtg     300
tcagaaagga gtctggctcg tgctggcttt tactacactg gtgccaatga caaggtcaag     360
tgcttctgct gtggcctgat gctagacaac tggaaacaag gggacagtcc catggagaag     420
cacagaaagt tgtaccccag ctgcaacttt gtacagactt tgaatccagc caacagtctg     480
gaagctagtc ctcggccttc tcttccttcc acggcgatga gcaccatgcc tttgagcttt     540
gcaagttctg agaatactgg ctatttcagt ggctcttact cgagctttcc ctcagaccct     600
gtgaacttcc gagcaaatca agattgtcct gctttgagca caagtcccta ccactttgca     660
atgaacacag agaaggccag attactcacc tatgaaacat ggccattgtc ttttctgtca     720
ccagcaaagc tggccaaagc aggcttctac tacataggac ctggagatag agtggcctgc     780
tttgcgtgcg atgggaaact gagcaactgg gaacgtaagg atgatgctat gtcagagcac     840
cagaggcatt tccccagctg tccgttctta aaagacttgg gtcagtctgc ttcgagatac     900
actgtctcta acctgagcat gcagacacac gcagcccgta ttagaacatt ctctaactgg     960
ccttctagtg cactagttca ttcccaggaa cttgcaagtg cgggctttta ttatacagga    1020
cacagtgatg atgtcaagtg tttatgctgt gatggtgggc tgaggtgctg ggaatctgga    1080
gatgacccct gggtggaaca tgccaagtgg tttccaaggt gtgagtactt gctcagaatc    1140
aaaggccaag aatttgtcag ccaagttcaa gctggctatc ctcatctact tgagcagcta    1200
ttatctacgt cagactcccc agaagatgag aatgcagacg cagcaatcgt gcattttggc    1260
cctggagaaa gttcggaaga tgtcgtcatg atgagcacgc ctgtggttaa agcagccttg    1320
gaaatgggct tcagtaggag cctggtgaga cagacggttc agtggcagat cctggccact    1380
ggtgagaact acaggaccgt cagtgacctc gttataggct tactcgatgc agaagacgag    1440
atgagagagg agcagatgga gcaggcggcc gaggaggagg agtcagatga tctagcacta    1500
atccggaaga acaaaatggt gcttttccaa catttgacgt gtgtgacacc aatgctgtat    1560
tgcctcctaa gtgcaagggc catcactgaa caggagtgca atgctgtgaa acagaaacca    1620
cacaccttac aagcaagcac actgattgat actgtgttag caaaaggaaa cactgcagca    1680
acctcattca gaaactccct tcgggaaatt gaccctgcgt tatacagaga tatatttgtg    1740
caacaggaca ttaggagtct tcccacagat gacattgcag ctctaccaat ggaagaacag    1800
ttgcggcccc tcccggagga cagaatgtgt aaagtgtgta tggaccgaga ggtatccatc    1860
gtgttcattc cctgtggcca tctggtcgtg tgcaaagact gcgctccctc tctgaggaag    1920
tgtcccatct gtagagggac catcaagggc acagtgcgca catttctctc ctgaacaaga    1980
ctaatggtcc atggctgcaa cttcagccag gaggaagttc actgtcactc ccagttccat    2040
tcggaacttg aggccagcct ggatagcacg agacaccgcc aaacacacaa atataaacat    2100
gaaaaacttt tgtctgaagt caagaatgaa tgaattactt atataataat tttaattggt    2160
ttccttaaaa gtgctatttg ttcccaactc agaaaattgt tttctgtaaa catatttaca    2220
tactacctgc atctaaagta ttcatatatt catatattca gatgtcatga gagagggttt    2280
tgttcttgtt cctgaaaagc tggtttatca tctgatcagc atatactgcg caacgggcag    2340
ggctagaatc catgaaccaa gctgcaaaga tctcacgcta aataaggcgg aaagatttgg    2400
agaaacgaaa ggaaattctt tcctgtccaa tgtatactct tcagactaat gacctcttcc    2460
tatcaagcct tcta                                                      2474
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<210> 40
<211> 602
<212> PRT
<213> Mus musculus

<400> 40
Met Asn Met Val Gln Asp Ser Ala Phe Leu Ala Lys Leu Met Lys Ser
 1   5   10   15
Ala Asp Thr Phe Glu Leu Lys Tyr Asp Phe Ser Cys Glu Leu Tyr Arg
            20   25   30
Leu Ser Thr Tyr Ser Ala Phe Pro Arg Gly Val Pro Val Ser Glu Arg
        35   40   45
Ser Leu Ala Arg Ala Gly Phe Tyr Tyr Thr Gly Ala Asn Asp Lys Val
    50   55   60
Lys Cys Phe Cys Cys Gly Leu Met Leu Asp Asn Trp Lys Gln Gly Asp
65   70   75   80
Ser Pro Met Glu Lys His Arg Lys Leu Tyr Pro Ser Cys Asn Phe Val
                85   90   95
Gln Thr Leu Asn Pro Ala Asn Ser Leu Glu Ala Ser Pro Arg Pro Ser
            100   105   110
Leu Pro Ser Thr Ala Met Ser Thr Met Pro Leu Ser Phe Ala Ser Ser
        115   120   125
Glu Asn Thr Gly Tyr Phe Ser Gly Ser Tyr Ser Ser Phe Pro Ser Asp
    130   135   140
Pro Val Asn Phe Arg Ala Asn Gln Asp Cys Pro Ala Leu Ser Thr Ser
145   150   155   160
Pro Tyr His Phe Ala Met Asn Thr Glu Lys Ala Arg Leu Leu Thr Tyr
                165   170   175
Glu Thr Trp Pro Leu Ser Phe Leu Ser Pro Ala Lys Leu Ala Lys Ala
            180   185   190
Gly Phe Tyr Tyr Ile Gly Pro Gly Asp Arg Val Ala Cys Phe Ala Cys
        195   200   205
Asp Gly Lys Leu Ser Asn Trp Glu Arg Lys Asp Asp Ala Met Ser Glu
    210   215   220
His Gln Arg His Phe Pro Ser Cys Pro Phe Leu Lys Asp Leu Gly Gln
225   230   235   240
Ser Ala Ser Arg Tyr Thr Val Ser Asn Leu Ser Met Gln Thr His Ala
                245   250   255
Ala Arg Ile Arg Thr Phe Ser Asn Trp Pro Ser Ser Ala Leu Val His
            260   265   270
Ser Gln Glu Leu Ala Ser Ala Gly Phe Tyr Tyr Thr Gly His Ser Asp
        275   280   285
Asp Val Lys Cys Leu Cys Cys Asp Gly Gly Leu Arg Cys Trp Glu Ser
    290   295   300
Gly Asp Asp Pro Trp Val Glu His Ala Lys Trp Phe Pro Arg Cys Glu
305   310   315   320
Tyr Leu Leu Arg Ile Lys Gly Gln Glu Phe Val Ser Gln Val Gln Ala
                325   330   335
Gly Tyr Pro His Leu Leu Glu Gln Leu Leu Ser Thr Ser Asp Ser Pro
            340   345   350
Glu Asp Glu Asn Ala Asp Ala Ala Ile Val His Phe Gly Pro Gly Glu
        355   360   365
Ser Ser Glu Asp Val Val Met Met Ser Thr Pro Val Val Lys Ala Ala
    370   375   380
Leu Glu Met Gly Phe Ser Arg Ser Leu Val Arg Gln Thr Val Gln Trp
385   390   395   400
Gln Ile Leu Ala Thr Gly Glu Asn Tyr Arg Thr Val Ser Asp Leu Val
                405   410   415
Ile Gly Leu Leu Asp Ala Glu Asp Glu Met Arg Glu Glu Gln Met Glu

```
            420                 425                 430
Gln Ala Ala Glu Glu Glu Glu Ser Asp Asp Leu Ala Leu Ile Arg Lys
        435                 440                 445
Asn Lys Met Val Leu Phe Gln His Leu Thr Cys Val Thr Pro Met Leu
    450                 455                 460
Tyr Cys Leu Leu Ser Ala Arg Ala Ile Thr Glu Gln Glu Cys Asn Ala
465                 470                 475                 480
Val Lys Gln Lys Pro His Thr Leu Gln Ala Ser Thr Leu Ile Asp Thr
                485                 490                 495
Val Leu Ala Lys Gly Asn Thr Ala Ala Thr Ser Phe Arg Asn Ser Leu
            500                 505                 510
Arg Glu Ile Asp Pro Ala Leu Tyr Arg Asp Ile Phe Val Gln Gln Asp
        515                 520                 525
Ile Arg Ser Leu Pro Thr Asp Asp Ile Ala Ala Leu Pro Met Glu Glu
    530                 535                 540
Gln Leu Arg Pro Leu Pro Glu Asp Arg Met Cys Lys Val Cys Met Asp
545                 550                 555                 560
Arg Glu Val Ser Ile Val Phe Ile Pro Cys Gly His Leu Val Val Cys
                565                 570                 575
Lys Asp Cys Ala Pro Ser Leu Arg Lys Cys Pro Ile Cys Arg Gly Thr
            580                 585                 590
Ile Lys Gly Thr Val Arg Thr Phe Leu Ser
        595                 600
```

<210> 41
<211> 2416
<212> DNA
<213> Mus musculus

<400> 41

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ctgtggtgga gatctattgt ccaagtggtg agaaacttca tctggaagtt taagcggtca      60
gaaatactat tactactcat ggacaaaact gtctcccaga gactcgccca aggtacctta     120
cacccaaaaa cttaaacgta taatggagaa gagcacaatc ttgtcaaatt ggacaaagga     180
gagcgaagaa aaaatgaagt ttgacttttc gtgtgaactc taccgaatgt ctacatattc     240
agcttttccc aggggagttc ctgtctcaga gaggagtctg gctcgtgctg gcttttatta     300
tacaggtgtg aatgacaaag tcaagtgctt ctgctgtggc ctgatgttgg ataactggaa     360
acaaggggac agtcctgttg aaaagcacag acagttctat cccagctgca gctttgtaca     420
gactctgctt tcagccagtc tgcagtctcc atctaagaat atgtctcctg tgaaaagtag     480
atttgcacat tcgtcacctc tggaacgagg tggcattcac tccaacctgt gctctagccc     540
tcttaattct agagcagtgg aagacttctc atcaaggatg gatccctgca gctatgccat     600
gagtacagaa gaggccagat ttcttactta cagtatgtgg cctttaagtt ttctgtcacc     660
agcagagctg gccagagctg gcttctatta catagggcct ggagacaggg tggcctgttt     720
tgcctgtggt gggaaactga gcaactggga accaaaggat tatgctatgt cagagcaccg     780
cagacatttt ccccactgtc catttctgga aaatacttca gaaacacaga ggtttagtat     840
atcaaatcta agtatgcaga cacactctgc tcgattgagg acatttctgt actggccacc     900
tagtgttcct gttcagcccg agcagcttgc aagtgctgga ttctattacg tggatcgcaa     960
tgatgatgtc aagtgccttt gttgtgatgg tggcttgaga tgttgggaac ctggagatga    1020
cccctggata gaacacgcca aatggtttcc aaggtgtgag ttcttgatac ggatgaaggg    1080
tcaggagttt gttgatgaga ttcaagctag atatcctcat cttcttgagc agctgttgtc    1140
cacttcagac accccaggag aagaaaatgc tgaccctaca gagacagtgg tgcattttgg    1200
ccctggagaa agttcgaaag atgtcgtcat gatgagcacg cctgtggtta aagcagcctt    1260
ggaaatgggc ttcagtagga gcctggtgag acagacggtt cagcggcaga tcctggccac    1320
tggtgagaac tacaggaccg tcaatgatat tgtctcagta cttttgaatg ctgaagatga    1380
gagaagagaa gaggagaagg aaagacagac tgaagagatg gcatcaggtg acttatcact    1440
gattcggaag aatagaatgg ccctctttca acagttgaca catgtccttc ctatcctgga    1500
taatcttctt gaggccagtg taattacaaa acaggaacat gatattatta gacagaaaac    1560
acagataccc ttacaagcaa gagagcttat tgacaccgtt ttagtcaagg gaaatgctgc    1620
agccaacatc ttcaaaaact ctctgaaggg aattgactcc acgttatatg aaaacttatt    1680
```

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tgtggaaaag aatatgaagt atattccaac agaagacgtt tcaggcttgt cattggaaga    1740
gcagttgcgg agattacaag aagaacgaac ttgcaaagtg tgtatggaca gagaggtttc    1800
tattgtgttc attccgtgtg gtcatctagt agtctgccag gaatgtgccc cttctctaag    1860
gaagtgcccc atctgcaggg ggacaatcaa ggggactgtg cgcacatttc tctcatgagt    1920
gaagaatggt ctgaaagtat tgttggacat cagaagctgt cagaacaaag aatgaactac    1980
tgatttcagc tcttcagcag gacattctac tctctttcaa gattagtaat cttgctttat    2040
gaagggtagc attgtatatt taagcttagt ctgttgcaag ggaaggtcta tgctgttgag    2100
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cttcttggga tttgggaatt tggggaaagc tttggaatcc agtgatgtgg agctcagaaa    2220
tcctggaacc agtgactctg gtactcagta gatagggtac cctgtacttc ttggtgcttt    2280
tccagtctgg gaaataagga ggaatctgct gctggtaaaa atttgctgga tgtgagaaat    2340
agatgaaagt gtttcgggtg ggggcgtgca tcagtgtagt gtgtgcaggg atgtatgcag    2400
gccaaacact gtgtag                                                    2416
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<210> 42
<211> 591
<212> PRT
<213> Mus musculus

<400> 42

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Lys Met Lys Phe Asp Phe Ser Cys Glu Leu Tyr Arg Met Ser Thr Tyr
            20                  25                  30
Ser Ala Phe Pro Arg Gly Val Pro Val Ser Glu Arg Ser Leu Ala Arg
        35                  40                  45
Ala Gly Phe Tyr Tyr Thr Gly Val Asn Asp Lys Val Lys Cys Phe Cys
    50                  55                  60
Cys Gly Leu Met Leu Asp Asn Trp Lys Gln Gly Asp Ser Pro Val Glu
65                  70                  75                  80
Lys His Arg Gln Phe Tyr Pro Ser Cys Ser Phe Val Gln Thr Leu Leu
                85                  90                  95
Ser Ala Ser Leu Gln Ser Pro Ser Lys Asn Met Ser Pro Val Lys Ser
            100                 105                 110
Arg Phe Ala His Ser Ser Pro Leu Glu Arg Gly Gly Ile His Ser Asn
        115                 120                 125
Leu Cys Ser Ser Pro Leu Asn Ser Arg Ala Val Glu Asp Phe Ser Ser
    130                 135                 140
Arg Met Asp Pro Cys Ser Tyr Ala Met Ser Thr Glu Glu Ala Arg Phe
145                 150                 155                 160
Leu Thr Tyr Ser Met Trp Pro Leu Ser Phe Leu Ser Pro Ala Glu Leu
                165                 170                 175
Ala Arg Ala Gly Phe Tyr Tyr Ile Gly Pro Gly Asp Arg Val Ala Cys
            180                 185                 190
Phe Ala Cys Gly Gly Lys Leu Ser Asn Trp Glu Pro Lys Asp Tyr Ala
        195                 200                 205
Met Ser Glu His Arg Arg His Phe Pro His Cys Pro Phe Leu Glu Asn
    210                 215                 220
Thr Ser Glu Thr Gln Arg Phe Ser Ile Ser Asn Leu Ser Met Gln Thr
225                 230                 235                 240
His Ser Ala Arg Leu Arg Thr Phe Leu Tyr Trp Pro Pro Ser Val Pro
                245                 250                 255
Val Gln Pro Glu Gln Leu Ala Ser Ala Gly Phe Tyr Tyr Val Asp Arg
            260                 265                 270
Asn Asp Asp Val Lys Cys Leu Cys Cys Asp Gly Gly Leu Arg Cys Trp
        275                 280                 285
Glu Pro Gly Asp Asp Pro Trp Ile Glu His Ala Lys Trp Phe Pro Arg
    290                 295                 300
Cys Glu Phe Leu Ile Arg Met Lys Gly Gln Glu Phe Val Asp Glu Ile
```

```
305                 310                 315                 320
Gln Ala Arg Tyr Pro His Leu Leu Glu Gln Leu Leu Ser Thr Ser Asp
                325                 330                 335
Thr Pro Gly Glu Glu Asn Ala Asp Pro Thr Glu Thr Val Val His Phe
            340                 345                 350
Gly Pro Gly Glu Ser Ser Lys Asp Val Val Met Met Ser Thr Pro Val
        355                 360                 365
Val Lys Ala Ala Leu Glu Met Gly Phe Ser Arg Ser Leu Val Arg Gln
    370                 375                 380
Thr Val Gln Arg Gln Ile Leu Ala Thr Gly Glu Asn Tyr Arg Thr Val
385                 390                 395                 400
Asn Asp Ile Val Ser Val Leu Leu Asn Ala Glu Asp Glu Arg Arg Glu
                405                 410                 415
Glu Glu Lys Glu Arg Gln Thr Glu Glu Met Ala Ser Gly Asp Leu Ser
            420                 425                 430
Leu Ile Arg Lys Asn Arg Met Ala Leu Phe Gln Gln Leu Thr His Val
        435                 440                 445
Leu Pro Ile Leu Asp Asn Leu Leu Glu Ala Ser Val Ile Thr Lys Gln
    450                 455                 460
Glu His Asp Ile Ile Arg Gln Lys Thr Gln Ile Pro Leu Gln Ala Arg
465                 470                 475                 480
Glu Leu Ile Asp Thr Val Leu Val Lys Gly Asn Ala Ala Ala Asn Ile
                485                 490                 495
Phe Lys Asn Ser Leu Lys Gly Ile Asp Ser Thr Leu Tyr Glu Asn Leu
            500                 505                 510
Phe Val Glu Lys Asn Met Lys Tyr Ile Pro Thr Glu Asp Val Ser Gly
        515                 520                 525
Leu Ser Leu Glu Glu Gln Leu Arg Arg Leu Gln Glu Glu Arg Thr Cys
    530                 535                 540
Lys Val Cys Met Asp Arg Glu Val Ser Ile Val Phe Ile Pro Cys Gly
545                 550                 555                 560
His Leu Val Val Cys Gln Glu Cys Ala Pro Ser Leu Arg Lys Cys Pro
                565                 570                 575
Ile Cys Arg Gly Thr Ile Lys Gly Thr Val Arg Thr Phe Leu Ser
            580                 585                 590
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<210> 43
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic based on viral sequence

<400> 43
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Met Glu Gln Lys Leu Ile Ser Glu Glu Asp Leu
 1               5                  10
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<210> 44
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic primer based on Homo sapiens

<400> 44

agtgcgggtt tttattatgt g 21

<210> 45
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic primer based on Homo sapiens

<400> 45
agatgaccac aaggaataaa cacta 25